

US EPA ARCHIVE DOCUMENT

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NALED

Ecology MULTIPLE

TIMS0030

DATA EVALUATION RECORD

PAGE 1 OF 5

CASE GS0006

~~TEMEPHOS~~

10-1-79

PM GW* 06/19/79

CHEM ~~050001~~

Temephos (C,C'- (thicdi-4,1-phenylene)

BRANCH EEE DISC 40 TOPIC 05103545

FORMULATION 12 - EMULSIFIABLE CONCENTRATE (EC CR E)

FICHE/MASTER ID 05000837

CONTENT CAT C1

Johansen, C.A. (1972) Toxicity of field-weathered insecticide residues to four kinds of bees. Environmental Entomology 1(3):393-394.

SUBST. CLASS = S.

OTHER SUBJECT DESCRIPTORS

EPM: PH-R-50-0515

SFC: EEE -55-10154044

DIRECT RVN TIME = 40 Hrs.(MH)

START-DATE

9/25/79

END DATE

10/1/79

REVIEWED BY: Richard M. Lee

TITLE: Entomologist

CRG: EEP/HED

LCC/TEL: 557-7484

SIGNATURE:

Richard M. Lee

DATE: Oct. 1, 79

APPROVED BY:

TITLE:

CRG:

LCC/TEL:

SIGNATURE:

DATE:

502

1

DATA EVALUATION RECORD

1. CHEMICAL: See Table 1
2. FORMULATION: See Table 1.
3. CITATION. Johansen, C.A. (1972) Toxicity of Field-Weathered Insecticide Residues to Four Kinds of Bees. Environmental Entomology 1 (3): 393-394. Fiche ID 05000837.
4. REVIEWED BY: R.M. Lee
Entomologist
Ecological Effects Branch/Hazard Evaluation Division
5. DATE REVIEWED: 9/27/79
6. TEST TYPE: Bee residue toxicity test
 - A. Test Species:
 - 1) honey bee: Apis mellifera L.
 - 2) alkali bee: Nomia melanderi Cockerell
 - 3) leafcutter bee: Megachile rotundata (F.)
 - 4) bumble bee: Bombus centralis Cresson
B. rufocinctus Cresson.
7. REPORTED RESULTS

The test results (as shown in Table 1) indicate that Temephos, Tetradifon, Phosalone and Isopropyl parathion were the least toxic against all the bee species tested. Imidan and Malathion were extremely toxic against both the honey bee and the alfalfa leafcutter bee. Endosulfan also produced 100% mortality in the alkali bees.
8. REVIEWER'S CONCLUSION: The study is scientifically sound. See table 1 for percent mortality data. However determinations of 24-h acute contact LC₅₀ and residual LD₅₀ are required for accurate assessment of bee hazard, although guidelines for regulatory requirement is not established at present.

2

Materials/Methods

Test Procedures

Field-weathered residue samples were obtained by applying the recommended rates of various insecticides to 1/100-acre plots of alfalfa with a hand sprayer at 25 gal/acre and 20 psi pressure. Sample foliages were collected from each plot at desired post-application intervals, chopped and placed in various bee cages. The experiments were conducted with 4 replicates and mortality was checked at 24-h. Experimental conditions for various bees were described as follows:

- A) Honey bees: 50-100 bees/cage were fed with sugar syrup and held at 78°F.
- B) Alkali bees and alfalfa leafcutter bees: 10-15 alkali bee/cage or 20-30 leafcutter bees/cage were fed with honey syrup and held at 88°F.

Statistical Analysis

Percent mortalities at 24-h for various bees were probably obtained by calculation of arithmetic average of four replicates. Data were also corrected with the untreated control mortalities by Abbott's formula.

Discussion/Results

Susceptibility of three most important bee pollinators to 25 common insecticides were compared. (See Table 1). The typical pattern of susceptibility is in descending order of alfalfa leafcutter bee > alkali bee > honey bee as shown in 17 of 25 insecticides tested. In the separate tests, two species of bumble bees were also tested and found to be generally more tolerant to the insecticide than the other 3 species of bees. This sequence appears to be related to their body sizes and due to their differences in surface: volume ratio, hairness and behavior.

Reviewers Evaluation

A. Test procedure

This study was intended to compare susceptibility of various bees to 25 commonly used insecticides. Therefore for hazard assessment, 24-h contact toxicity study and foliage residual as well as subacute feeding studies, should be conducted with dose-response assay.

Table 1.-Effect of insecticide residues on alfalfa to alfalfa leafcutter bees (LB). alkali bees (AB), and honey bees (HB).

Insecticide	Lb/acre	Age of residues	24-hr % mortality		
			LB	AB	HB
Biothion 4 lb EC	0.5	3 hr	21	12	9
Carbaryl 80% WP	1.0	2 days	85	78	69
Carbophenothion					
4 lb FP	1.5	3 hr	89	33	6
Demeton 2 lb EC	.5	6 hr	26	19	1
DDT 1 lb EC	1.5				
+ toxaphene					
2 lb EC	3.0	3 hr	94	68	55
Dicofol 4 lb EC	1.0	3 hr	2	7	8
Dicrotophos 9 lb EC	.5	2 days	40	29	7
Dimethoate					
2.67 lb EC	.5	2 days	45	30	4
Endosulfan 2 lb EC	1.0	3 hr	71	100	11
Gardona 2 lb EC	1.0	3 hr	70	26	4
Galecron 95% SP	1.0	3 hr	0	0	0
Imidan 50% WP	1.0	3 hr	100	63	98
Isopropyl parathion					
3 lb EC	1.0	10 hr	8	0	0
Malathion 5 lb EC	1.0	6 hr	100	47	100
Methomyl 90% WP	1.0	1 day	65	40	1
Methyl parathion					
4 lb EC	.5	10 hr	71	48	89
Naled 8 lb EC	.5	3 hr	100	30	21
Omite 6 lb EC	1.5	3 hr	18	12	1
Parathion 4 lb EC	.5	10 hr	50	66	41
Phosalone 3 lb EC	1.5	3 hr	14	13	0
Phosphamidon					
8 lb EC	.5	2 days	30	23	10
Phosvel 3 lb EC	1.0	3 hr	100	63	3
Schradan 90% LS	1.0	3 hr	89	6	0
Tetradifon					
1 lb EC	.75	3 hr	20	5	0
Trichlorfon					
50% SP	1.0	3 hr	5	31	17

B. Statistical Analysis

Four accurate determination of toxicities hence hazard assessment of testing insecticides, calculation of median responses by means of probit analysis, or other similar procedure, is essential.

C. Discussions/Results

The result obtained reveals relative toxicities of 25 insecticides against three important bee species. However, determination of contact LD₅₀ (and residue LD₅₀, if necessary) is required to be categorized as "core" data.

D. Conclusions

1. Category: Supplemental
2. Rationale
3. Repairability: This study can't be upgraded. to "core" under present pre-proposed guidelines.

Percent mortalities of three bee species exposed to 25 insecticides residues at recommended rates were reported. However, for hazard assessment, determination of contact LD₅₀ and residual LD₅₀ (if contact LD₅₀ is less than 11 µg per bee) is necessary based on regulatory guidelines which is presently under development.

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